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Theory of nuclear spin-lattice relaxation in YBa2Cu3O7

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Abstract

Within the framework of the t-J model, we have calculated the temperature dependence of the nuclear spin-lattice relaxation rate, 1/T1, of 63Cu, 17O, and 89Y in the normal state of the superconductor YBa2Cu3O7. The main contribution to the Cu rate arises from strong short-range antiferromagnetic correlations between copper spins; the 17O and 89Y rates are dominated by spin fluctuations of longer wavelength. The theory is able to reproduce the main features of the temperature dependence of 1/T1 as observed experimentally.